Parameters of Dutch Relay Protection Transformers

Article Overview

Dutch relay protection transformers are typically protected using a combination of differential, overcurrent, over-fluxing, thermal, and earth fault relays, with settings tailored to transformer ratings, vector groups, and CT ratios.

Key Protection Functions

1. Differential Protection (87): This is the most sensitive protection for internal transformer faults. It compares currents entering and leaving the transformer windings. If the difference exceeds a preset threshold, the relay trips. Proper CT ratio selection and vector group compensation (e.g., Dyn11) are essential to avoid false trips due to phase shifts or CT mismatches. Inrush current during energization is restrained using harmonic detection, typically the 2nd harmonic >15% ( ). 2. Overcurrent Protection (51/50): Phase and ground overcurrent relays protect against overloads and external short circuits. Settings are based on transformer full-load current and may include time-inverse characteristics for phase currents and instantaneous tripping for severe faults ( ). 3. Over-Fluxing Protection (24): Protects the transformer core from excessive magnetic flux, which can occur during overvoltage or incorrect tap changer operation. The relay monitors voltage and frequency to prevent core saturation ( ). 4. Thermal Protection (49): Monitors winding and oil temperatures using RTDs or fiber-optic sensors. Prevents insulation damage due to overheating, especially under prolonged overload conditions ( ). 5. Buchholz Relay (Gas Detection): Used in oil-filled transformers to detect gas accumulation from internal faults. It provides early warning of arcing or insulation failure ( ). 6. Restricted Earth Fault Protection (REF/64): Provides sensitive earth fault protection within the transformer zone, detecting ground faults that may not trigger standard overcurrent relays ( ). 7. Pressure Relief and Fire Safety: Pressure relief devices prevent tank rupture during severe internal faults. For indoor installations, less-flammable insulating fluids and silica gel breathers are often used to reduce fire risk ( ).

Relay Setting Considerations

o CT Ratios: Must be matched across all windings to ensure accurate differential protection. Current match factors (CMF) are applied to balance HV and LV currents ( ).
o Vector Group Compensation: Relays must account for phase shifts between primary and secondary windings (e.g., Dyn11, YNd1) to avoid false tripping ( ).
o Slope Settings: Differential relays use slope settings (e.g., 0.8) to maintain stability under CT saturation or external faults ( ).
o Inrush Restraint: Harmonic detection prevents tripping during transformer energization ( ).

Transformer Parameters Affecting Protection

o Rated Voltage and kVA: Protection schemes are often tied to transformer MVA and primary voltage ( ).
o Connection Type: Delta or wye connections influence relay settings and earth fault detection ( ).
o Insulation Levels (BIL): Determines overvoltage protection requirements ( ).
o Oil Type and Cooling: Impacts thermal protection and fire safety measures ( ).

Modern Protection Relays

Digital relays like ABB RET615 provide integrated protection, control, measurement, and supervision for two-winding and step-up transformers. They combine multiple protection functions in a single device, simplifying configuration and improving reliability ( ). Summary: Dutch relay protection transformers rely on a combination of differential, overcurrent, thermal, over-fluxing, and earth fault protection, with careful attention to CT ratios, vector group compensation, and inrush restraint. Modern digital relays integrate these functions, ensuring fast, reliable, and safe transformer operation.

The transformer is heart of power system. Power transformer is a major equipment in power

This article explains the most commonly used transformer protection methods-what they do, when to use them, and how to choose

The impact of different electrical parameters and system performance considerations on the selection of relays and protection

Transformer protection relay This specification is valid for applications where usually following criterions are applicable Dedicated two

A practical guide to transformer faults, relay functions, protection zones, differential protection, Buchholz relays, trip

In this post, we have learn about transformer relay setting calculation. Like Differential, IDMT, overcurrent, REF, Earth fault E/F, Over

TRANSFORMER PROTECTION APPLICATION GUIDE1 This guide focuses primarily on application of protective relays for the

The DMCR is a protection relay for the hermetically sealed oil immersed transformers and

Rules for protecting a network using overcurrent relays. Requirements for instrumentation (number and locations of instrument

Parameters of Dutch Relay Protection Transformers

The protection philosophy incorporates three broad steps: Get an understanding of the protection functions required for transformer

IEEE SA - The IEEE Standards Association - Home

RET615 is a dedicated transformer protection and control relay for protection, control, measurement and supervision of power

Protective relays and devices have been developed over 100 years ago to provide "last line" of defense for the electrical systems.

Complete guide to transformer protection covering Buchholz relay, differential protection, overcurrent, overheating, and over-fluxing

Numerical transformer protection in medium voltage networks The freely configurable relay is intended for protection, control,

Protection Settings The documents presented should serve as a model to various utilities in preparing similar

Web: https://kremgroup.co.za